

Method for quickly producing read and/or write
readiness of an apparatus for reading from and/or
writing to an optical recording medium, and
correspondingly configured apparatus

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Field of the invention

The present invention relates to a method for quickly
producing read and/or write readiness of an apparatus
for reading from and/or writing to an optical recording
medium, and a correspondingly configured apparatus for
reading from and/or writing to an optical recording
medium.

15 Background of the invention

After an optical recording medium has been inserted
into a corresponding apparatus for reading from and/or
writing to this optical recording medium, the optical
recording medium can be accessed only after a certain
waiting time. This waiting time, which may last for
tens of seconds for example in the case of DVD-ROM or
DVD-Video, is down to the fact that firstly diverse
adjustment steps have to be carried out in order to
prepare the apparatus for reliable reading from and/or
writing to the respective optical recording medium.

The adjustment steps to be carried out during this
waiting or adjustment time depend, in particular, on
the type of optical recording medium used in each case.
The more different types of optical recording media
there are, and the more different types the
respectively used apparatus can read from and/or write
to, the longer this adjustment time lasts. Therefore,
there is in principle a need to shorten this adjustment
time as far as possible.

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JP 07-192386 describes a CD player, an identification code of a CD-ROM that has been inserted into the CD player being read and compared with the data stored in a RAM memory. If correspondence is ascertained in this way, setting data that are likewise stored in the RAM memory are read out and used for starting the system. The setting data are setting information items which a user can select during normal operation of the CD player via a menu-controlled interface. In this way, by way of example, menu configurations or game statuses which were created e.g. for a game - contained on a CD-ROM - for a personal computer (PC) can be reloaded, so that these menu configurations or game statuses do not have to be created anew and the start of the overall system after the power supply has been switched on can be accelerated. Individual identification of the CD-ROM does not take place, however, since, by way of example, all CD-ROMs with the same computer game must have the same identification code.

Moreover, US 4,872,151 proposes reading an identification code of a compact disc (CD) and comparing it with the identification code already stored in a storage device. If correspondence is ascertained, an order - already stored together with the identification code - for the reproduction of the titles contained on the CD can be loaded and the reproduction of the CD can be carried out in accordance with this loaded order. However, with this procedure, too, individual identification of the CD does not take place, since, by way of example, all CDs with the same titles must have the same identification code.

Finally, DE 31 39 543 A1 proposes a system for automatically controlling record players, an optoelectronic information item being printed on the periphery of the label of a record, the said information item containing record-specific data in the

form of a bar code. This optoelectronic information item may comprise data which define for example the speed of revolution, so that reading of this optoelectronic information item enables the automatic control of various record player functions. However, individual identification of the respective record is not possible with the aid of this optoelectronic information item, since, by way of example, all records of a specific title are printed identically.

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Summary of the invention

One object of the present invention is to propose a method for quickly producing read and/or write readiness of an apparatus for reading from and/or writing to an optical recording medium, and a correspondingly configured apparatus, it being possible to shorten the previously mentioned waiting or adjustment time after the insertion of the optical recording medium into the apparatus.

This is achieved according to the invention by means of a method and an apparatus having the features of the respective independent claims. The subclaims each define preferred and advantageous embodiments of the present invention.

The invention can generally be applied to optical recording media which can be distinguished using individually stored features or identification information items. This is true, in particular, of DVD-ROM media, since the latter often have a "BCA code" ("Burst Cutting Area") which is individually allocated for each medium or each recording medium. After the uniform production of a series of discs, the "Burst Cutting Area" is applied by a burning operation into a specific area of the individual disc. This BCA data area is normally provided for identification and

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authorization of the disc. Since this BCA data area uniquely identifies a disc, this BCA data area can be used for individual recognition of the corresponding disc.

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According to the invention, after the insertion of the recording medium, the corresponding identification information of the respective recording medium is detected in order to identify the recording medium. A check is then made to determine whether, for the identified recording medium, adjustment parameter values for operation of the apparatus are stored in a storage device. If this is the case, the adjustment parameter values are read from the storage device and used for adjusting the apparatus, with the result that read and/or write readiness of the apparatus can be rapidly produced.

If the recording medium is inserted into the apparatus for the first time, however, it is not possible to ascertain such adjustment parameter values in the storage device. Therefore, the customary adjustment procedure must be carried out in order to set for example the parameters "focus gain", "focus offset", "track gain", "track offset" or "HF gain" and to prepare the apparatus for reliably reading from and/or writing to the optical recording medium. Afterwards, the list of contents of the recording medium can be read and the first access can be made to a data area prescribed by the respective user. The values - set for the recording medium that has been inserted into the apparatus for the first time - of the previously mentioned adjustment parameters and also, if appropriate, of further control or regulating circuit parameters or of other parameters specific to the individual recording medium are stored together with the corresponding identification information items or individual features of the recording medium, so that

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when the recording medium is reinserted into the apparatus, they can be read out in the manner previously described and be used for rapidly producing read and/or write readiness of the apparatus.

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The adjustment parameter values are stored for example in a non-volatile memory within the apparatus or, in the case of an apparatus connected to another device as e.g. to a personal computer (PC), in a configuration file outside the apparatus. In accordance with a variant of the present invention, the list with the known recording media, together with the corresponding adjustment parameter values, can be stored as a non-volatile file on the hard disk of a PC and, in the event of switch-on of the PC and the subsequent initialization of the built-in read and/or write apparatus, can be accepted into a volatile memory of the corresponding apparatus, so that a data exchange between the apparatus and the hard disk of the PC is not necessary every time a recording medium is inserted into the read and/or write apparatus.

It is particularly advantageous if the content of the BCA data area is read as the identification information which individually identifies the respective recording medium, since this BCA data area comprises relatively coarse structures and can be read very easily by a read apparatus. For this purpose, all that is necessary is for the objective lens of the playback apparatus to be coarsely focused by the focus regulation. Track regulation is not necessary since the BCA information is very large in relation to the scanning beam and lies on a specific diameter of the recording medium. Thus, prior to the reading of the BCA information, it is not necessary to adjust the focus offset or any parameters of the track regulation.

Rather, it is necessary merely for that diameter of the recording medium which comprises the BCA information to be touched by the scanning beam. This is expediently done by displacing the optical scanner into a position
5 which is predetermined for the BCA information or another information item which identifies the individual recording medium.

In order to recognize the inserted recording medium, it
10 is also possible, however, to use other identification features provided that the latter enable the individual recording media to be individually distinguished. Thus, by way of example, the list of contents of the inserted recording medium can also be used as an identification
15 feature, since it is unlikely that a user will have a plurality of recording media having the same content. Individualization of the recording medium can, for example, also be effected via the detection of a printed-on label, for example a bar coding, provided
20 that this is correspondingly unique. Detecting an electrical or magnetic detectable individualization information item also lies within the scope of the invention.

25 According to the invention, then, the adjustment parameter values for each individual optical recording medium are determined only once, namely when the said recording medium is inserted into the read and/or write apparatus for the first time. When the same recording
30 medium is re-inserted, the adjustment parameter values that have already been determined previously can be read from a storage device and be used for accelerated adjustment. In this way, the waiting time which is necessary after the insertion of an optical recording
35 medium until access to the optical recording medium can be distinctly reduced.

The present invention is explained in more detail below using preferred exemplary embodiments with reference to the accompanying drawings.

5 Brief description of the drawings

Fig. 1 shows a simplified block diagram of a DVD-ROM read apparatus in accordance with a first exemplary embodiment of the present invention, and

Fig. 2 shows a simplified block diagram of a DVD-ROM read apparatus in accordance with a second exemplary embodiment of the present invention.

15 Detailed description of preferred embodiments

Figure 1 illustrates an optical recording medium 1, a DVD-ROM disc in the example illustrated, which is made to rotate by a drive unit 3. After the insertion of the DVD-ROM disc 1, the "BCA data area" of the DVD-ROM disc 1 is read by an optical read unit 2. This BCA data area uniquely identifies the respectively inserted DVD-ROM disc 1, so that the respectively inserted DVD-ROM disc 1 can be individually inferred by evaluation of the BCA data area. The use of the BCA data area for identifying the DVD-ROM disc 1 is advantageous since this comprises relatively coarse structures and can be read very easily by the read apparatus. All that is necessary is for the objective lens of the optical read unit 2 to be coarsely focused by corresponding focus regulation, while track regulation is not necessary since the BCA data area is very large in relation to the scanning beam of the optical read unit and lies in a specific diameter region of the DVD-ROM disc 1. Consequently, the scanning beam of the optical read unit 2 merely has to be moved to this specific diameter region of the DVD-ROM disc 1, preferably into the centre of the said region.

If this is not the case, i.e. if the DVD-ROM disc 1 has been inserted into the read apparatus for the first time, an adjustment operation that is customary per se must be carried out in order to prepare the optical read unit 2 for reliable reading of the DVD-ROM disc 1. In this case, diverse adjustment steps have to be performed in order to set control or regulating circuit parameters, for example, for the focus or tracking regulation, the parameters "focus gain", "focus offset", "track gain", "track offset" or "HF gain" of the optical read unit 2, to values which are as optimal as possible for reading the DVD-ROM disc 1. Afterward, the list of contents of the DVD-ROM disc 1 can be read by the optical read unit 2 and a first access can be made to a data area prescribed by the user. The individual features or identification information items of the BCA data area which identify the identified DVD-ROM disc 1 are stored together with the values - set by the control unit 4 - of the previously mentioned adjustment parameters in the non-volatile memory 5, so that, in the event of repeated use of the same DVD-ROM disc 1, they can be used in the manner described below for accelerated adjustment of the optical read unit 2.

35 In the event of repeated use of the DVD-ROM disc 1, the control unit 4 will ascertain from the identification information items read, by means of a comparison with

the list of already known discs which is stored in the memory 5, that the same DVD-ROM disc 1 has already been identified previously and the optical read unit 2 has been correspondingly adjusted. The control unit 4 thereupon reads out the adjustment parameter values stored for the identification information items of the corresponding DVD-ROM disc 1 in the memory 5 and uses them as start values for the adjustment of the optical read unit 2. It may be possible for the adjustment also to be entirely obviated and to begin immediately with the reading of the data required by the user, as a result of which the access to the DVD-ROM disc 1 can be further accelerated. In this case, the start values matched according to the invention to the respective individual recording medium are so close to the actually optimal values that the time according to the invention for the adjustment is shortened even when the start values are still adjusted in an optimized manner.

In the exemplary embodiment shown in Figure 1, the output units illustrated are a display unit 6 and also a loudspeaker 7, via which the information of the DVD-ROM disc 1 read by the optical read unit 2 can be reproduced. In addition to audio and video information, general data can also be stored on the DVD-ROM disc 1, which data are forwarded to corresponding evaluation units.

It goes without saying that the apparatus shown in Figure 1 need not exclusively be a read apparatus, rather, instead of the optical read unit 2, it is also possible to use a combined optical write/read unit or just an optical write unit, so that it is possible to write to and/or read from the optical recording medium 1 used in each case.

A second exemplary embodiment of the present invention is illustrated in Figure 2, the components

corresponding to the components shown in Figure 1 being provided with the same reference symbols.

In the exemplary embodiment shown in Figure 2, the DVD-ROM read apparatus illustrated is connected to a personal computer (PC). What is used as non-volatile memory for the identification information items of already identified DVD-ROM discs 1 and/or for the corresponding adjustment parameter values is a configuration file of the PC, which is stored for example on the hard disk 8 of the PC. The control unit 4 can access this configuration file of the hard disk 8 at any time in order to ascertain whether, for an identified DVD-ROM disc 1, adjustment parameter values have already been previously determined and stored. If this is the case, the adjustment parameter values stored for the identification information items read are loaded and used for adjusting the optical read unit 2. In the other case, the previously described adjustment steps must be performed and the adjustment parameter values determined in the process must be stored together with the identification information items of the inserted DVD-ROM disc 1 in the configuration file of the hard disk 8.

Since every access to the hard disk 8 by the control unit 4 can last several milliseconds, it is advantageous if the memory 5 already shown in Figure 1 is additionally used, in which case, in the exemplary embodiment shown in Figure 2, the memory 5 can also be configured as a volatile memory. When the PC is switched on, the content of the configuration file of the hard disk 8 is accepted into the volatile memory 5 of the DVD-ROM read apparatus, so that the control unit 4 can subsequently carry out the checking of the list of already known DVD-ROM discs 1 by accessing the memory 5. Consequently, a data exchange between the

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read apparatus and the hard disk 8 is not necessary
every time a new DVD-ROM disc 1 is inserted.

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